Measuring Success Factors of E-Commerce Infomediary

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Abstract

Infomediaries are intermediaries that aggregate information from multiple electronic commerce retailers and provide services of searching and comparison for Internet customers. It provides added values to the traditional one-to-one business-to-customer electronic commerce. Measures that influence the success of Internet commerce has been studied by Torkzadeh and Dhillon (2002) based on the means objectives and fundamental objectives that were identified by Keeney (1999). However, those measures are developed for general one-to-one business-to-customer electronic commerce and do not include specific characteristics of infomediaries. This paper describes the development of instruments to measure the factors that influence infomediary success. We generated 136 items for means and fundamental objectives of infomediaries. These constructs were examined for reliability and validity. The results suggested a 4-factor, 21-item instrument to measure mean objectives in terms of online payment, navigation design, information relevance and product choice, and a 6-factor, 14-item instrument to measure fundamental objectives in terms of shopping enjoyment, transaction time, shopping convenience, product value, cost and searching time.

1. INTRODUCTION

1.1. Infomediary

An Infomediary is a Web site that gathers and organizes large amounts of data and acts as an intermediary between those who need the information and those who supply the information. It simplifies, abstracts, reduces, merges, and explains data (Wiederhold, 1992). An Infomediary is considered as a new Internet business model that applies to firms that help customers to deal with online vendors more efficiently and effectively (King, 1999). In electronic commerce, it functions as a third party provider of unbiased information and a business matchmaker. For example, MySimon, BizRate, and Yahoo shopping are infomediaries for general products such as books and computers; while Expedia, Priceline, and Travelocity are infomediaries for flight tickets, hotels and rental cars. An Infomediary also provides vendors with consumer information to help them focus on products and services customers want. Although Infomediary has become an important business protocol in e-commerce, there are no metrics to measure its success.

1.2. Success of Information Systems

Measurement on the success of information systems (IS) is always an important issue in the management of information systems. There are many research works on determining the reliable means and ways of measuring system success. IS user satisfaction (ISUS) has always been tied as the contributing factor for system success evaluation (Bailey and Pearson, 1983; DeLone and McLean, 1992; Doll and Torkzadeh, 1988). According to Au et al. (2002), who has conducted a review of information system user satisfaction based on an extensive literature search of over 50 related studies, user satisfaction is the most widely used measure of IS success. It has the high degree of face validity of satisfaction, due to reliable

instruments having been developed by past researchers, and also the conceptual weakness of most other measures. User satisfaction is also a critical construct in the sense that it is often used as a surrogate of management information system success (Bailey and Pearson, 1983), and it is also related to other important variables in system analysis and design. Au et al. (2002) found that sometimes sound technical system performance not necessarily guarantee high user satisfaction. Most systems fail to meet the objectives and aspirations held for them, not because they are not technically sound, but because psychological issues are not addressed during the development, implementation and use of the system.

Figure 1. Web sites of infomediaries – MySimon, BizRate, Yahoo! Shopping, Expedia, priceline and Travelocity.

Though there are many user information satisfaction (UIS) and end-user computing satisfaction (EUCS) measures to evaluate information system success, there are not any suitable measures for infomediary success evaluation. Measures of user information satisfaction developed for the conventional data processing environment or end-user computing environment may not be appropriate for the web information system, especially Infomediary. The reason is that UIS and EUCS instruments focus primarily on general or specific user information within an organization rather than on customer satisfaction with regard to e-commerce. To mitigate this problem, Keeney (1999) attempted to determine the value of Internet commerce to the customer. Based on the identified values of Internet commerce, Torkzadeh and Dhillon (2002) developed an instrument to measure the success of

Internet Commerce. However, this instrument is developed for general Internet commerce systems and the specific characteristics of infomediaries have not been considered.

2. USER SATISFACTION

2.1. User Satisfaction

In general, satisfaction can be understood as fulfillment of a need. Tessier et al. (1977), defined satisfaction as clearly a state of mind experienced (or not experienced) by the user. User's satisfaction will be a function of how well the product fits his requirement. As for IS end-users, Ives et al. (1983) defined user information satisfaction (UIS) as the extent to which users believe the information system meets their information requirements. It is a set of user's beliefs about the relative value of IS. Doll and Torkzadeh (1988) defined end-user computing satisfaction (EUCS) as the affective attitude towards a specific computer application by someone who interacts with the application directly. It is the IS end-user's overall affective evaluation of the pleasurable level of consumption-related fulfillment experienced with the IS. IS end user refer to non-technical personnel who use or interact with the system directly, as opposed to technical personnel who design the IS.

2.2. Factors/dimensions affecting IS User Satisfaction

According to Au et al. (2002), the most frequently used instrument for UIS is developed by Bailey and Pearson (1983), who identified a list of 39 indicators that contribute to end user satisfaction (EUS) with IS. The instrument was re-examined by Ives et al. (1983), and later again by Baroudi and Orlikowski (1988), which result in a shortened (comprising 13 items) measurement, which can be broadly grouped into three main dimensions: Information Quality, EDP Staff and Services, and User Knowledge. Typical measures of Information Quality include accuracy, relevance, completeness, currency, timeliness, format, security, documentation and reliability. Measures of EDP Staff and Services mainly comprise staff attitude, relationships, level of support, training, ease of access and communication. Finally, measures of User Knowledge mainly include user training, user understanding and participation.

Doll and Torkzadeh (1988) identified five factors for measuring EUS: content, accuracy, format, ease of use and timeliness. These factors are mainly related to Information Quality mentioned above. Other dimensions such as top management support, organization support or user support structures of any kind are also suggested as influencing IS user satisfaction (Mahmood et al., 2000). In addition, two other IS dimensions, namely System Quality and Interface Quality are categorized by other researchers from the IS attributes list (Suh et al., 1994). Most measures in the former dimension are engineering oriented technical performance such as speed, features, etc. The latter category refers to the interaction between the end-user and the computer system. After the review of over 50 papers, Au et al. (2002) concludes that the major dimensions of IS performance relevant to and having a significant impact on EUS consists of Information Quality, System Quality and System Support Services. With reference to previous validated instruments (Doll and Torkzadeh, 1988; Ives et al., 1983), the Information Quality construct is measured by nine indicators, namely accuracy, availability, reliability, updatedness, relevance, timeliness, completeness, presentation format and accessibility. Six indicators, namely, response time, reliability, functionality, flexibility, user friendliness and ease of integration, are used to measure the System Quality construct. Finally, the System support service will be measured by another six indicators, namely, promptness, reliability, responsiveness, technical competence, attitude of system support people, ability of keeping accurate records and provision of training course. Recently,

Abdinnour-Helm et al. (2005) has revised and revalidated the EUCS instrument to measure satisfaction with a Web site from a usability perspective and found that EUCS is a valid and robust instrument in the Web environment except some refinement on timeliness sub-factor. In general, most of these studies have used a multivariate approach when measuring satisfaction and then tended to operationalize satisfaction from a list of indicators, and inferred a level of satisfaction from the sum of responses to these indicators (Bruce, 1998).

2.3. Web Customer Satisfaction

In this work, we focus on electronic commerce system. Users of electronic commerce systems are trying to identify the products of interest and make purchasing order through the Internet. For traditional commerce, Kotler (1997) defined customer satisfaction as the consequence of the customer's experience during various purchasing stages: need arousal, information search, alternatives evaluation, purchase decision and post-purchase behavior. Based on this definition, McKinney et al. (2002) proposed that web customer satisfaction is formed at the information searching stage and attempted to identify the construct. The construct is broken up into two major dimensions: Information quality (IQ) and System quality (SQ). Research studies (Jarvenpaa and Todd, 1997; Szymanski and Henard, 2001) suggest that aspects of product information (related to IQ) and web site designs (related to SQ) are both important determinants in offering customer satisfaction. As it is feasible to separate content from the content delivery system in web site, the authors suggested the approach to model information and system aspects separately for web customer satisfaction. In the study, six factors for information quality and system quality are identified respectively. They are understandability, reliability, usefulness, relevance, adequacy and scope in the information quality aspects; access, usability, navigation, entertainment, hyperlinks, and interactivity in the system quality domain.

Keeney (1999) proposed to evaluate the success of Internet Commerce from customer perspectives. He proposed to model the problem as a "value focused thinking" process and he interviewed over one hundred individuals about their values in using Internet Commerce that they experienced or envisioned. Keeney (1999) characterized the "value proposition" concept as the benefits and costs of what the Internet offers customers as compared to currently available traditional means. The decision context presents the alternatives appropriate for a given decision situation; values are the principles used for evaluating the desirability of possible alternatives, fundamental objectives are the ends objectives and means objectives are the methods to achieve the ends. The ultimate fundamental question (i.e. overall objective) is considered as to maximize customer satisfaction.

Keeney (1999) used the concepts of value focused thinking in three steps. First, a list of customer values is developed through personal interviews. In the second step, the values identified in the first step are converted into objectives. An objective is defined as something one wants to strive towards and is composed of three features, decision context, an object and a direction of preference. At the third stage, values were organized so as to indicate their relationships. Similar objectives are classified into categories. As a consequence, the 91 objectives identified are grouped into 25 categories. Out of these 25 objectives, 9 constructs is classified under fundamental objective - fundamental reasons for purchasing on the Internet or not (i.e., objectives customers consider important for Internet Commerce). The other 16 constructs are under means objective, which helps to achieve one or more of the other objectives (i.e., objective that influence online purchase).

The fundamental objectives identified by Kenney are:

1. Maximize Product Quality
2. Minimize Cost
3. Minimize Time to Receive Product
4. Maximize Convenience
5. Minimize Time Spent
6. Maximize Privacy
7. Maximize Shopping Enjoyment
8. Maximize Safety
9. Minimize Environmental Impact

The means objectives identified by Kenney are:

1. Minimize Fraud
2. Assure System Security
3. Maximize Access to Information
4. Maximize Product Information
5. Minimize Misuse of Credit Card
6. Minimize Misuse of Personal Information
7. Assure Reliable Delivery
8. Limit Impulsive Buying
9. Maximize Accuracy of Transaction
10. Enhance Comparison Shopping
11. Make Better Purchase Choices
12. Maximize Product Variety
13. Maximize Product Availability
14. Minimize Personal Travel
15. Maximize Ease of Use
16. Offer Personal Interaction

Based on the work of Keeney (1999), Torkzadeh and Dhillon (2002) did a study and gathered data to develop measures of constructs suggested by Keeney. The instrument is 5-factor, 21-item that measures means objectives in terms of Internet product choice, online payment, Internet vendor trust, shopping travel, and Internet shipping errors; 4-factor, 16-item that measures fundamental objectives in terms of Internet shopping convenience, Internet ecology, Internet customer relation, and Internet product value. The instruments were tested for purification, unidimensionality, reliability, brevity and simplicity.

3. RESEARCH METHODS

In our study, we attempt to understand what customers consider most important in using Infomediary. We develop an instrument of measuring factors that influence the success of Infomediary. And there are three possible contexts for measurement development. In situations where there is a strong theory, items of construct are generated using established theory base. In other cases where there is a weak theory, it is prudent to augment theory with practice and use a combination of theory and practice for item generation. Where there is no theory, researchers can rely on experienced professionals for item generation. Since there is no widely accepted definitions of Infomediary satisfaction construct, we generated a list of items based on Keeney (1999). Keeney (1999) provided us a structured foundation to evaluate the success of Internet commerce. However, the values proposed in Keeney (1999) may not be specific for evaluating Infomediary. Infomediary provides a platform for both the large and rapidly growing consumer base and supplier base to meet and match their needs. It helps to facilitate the consummation of transaction. Hence, Infomediary acts as mediator of information and transaction, with its function rests primarily on solving the information aspect problem. In order to develop an instrument for evaluating the success factors of Infomediary, we adopt the "value proposition approach" suggested by Keeney (1999) as the building block for instrument in our research. And then we try to hypothesize a more comprehensive list of factors a priori, on top of the means objectives and fundamental objectives identified in Keeney (1999), by adding dimensions identified through the review of other related MIS literatures. Items are developed to tap each dimension. The list of items is purified, tested and validated by psychometric analysis, and the recommended instrument for Infomediary is generated.

3.1. Customer Values on Infomediary

We characterize the value proposition as benefits and costs of what the Infomediary offers to the customer. According to Torkzadeh and Dhillon (2002), in value-focused thinking, we need to consider three classes of definition: decision context, values, and fundamental

objectives. The decision context presents alternatives appropriate for a given decision situation and is specified by the range of activities being contemplated. Values are principles used for evaluating the desirability of possible alternatives in a specific decision situation. Values come into play prior to a given "decision problem". We define the decision context as "whether or not to use Infomediary before making a purchase of product or service", while values are the principles used for evaluating the desirability of using Infomediary. In assessing the value of Infomediary to the customer, the ultimate fundamental question is to "maximize customer satisfaction". Fundamental objectives make explicit the values that one cares about and define the consequences of concern. On the other hand, means objectives are the methods to achieve the ends. In this case, means objectives influence the people usage of Infomediary while fundamental objectives are perceived by user to be important for Infomediary. Thus, the measurement of success factors of Infomediary relies heavily on the functions of Infomediary from the point of view of users.

3.1.1. *Means Objectives and Fundamental Objectives*

In e-commerce, Infomediary functions not only as third party provider of unbiased information but also a business matchmaker. Infomediaries help e-commerce companies leverage the Internet to unite buyers and suppliers in a single, efficient virtual marketspace to facilitate a transaction (Grover and Tenh, 2001). As a result, the means and fundamental objectives described by Keeney (1999) are also applicable to Infomediaries, as customer use Infomediaries to help them in deciding whether to make an Internet purchase. Although the importance of some of the objectives may change in this case, we still include them into our lists so as not to miss out any objectives customers may take into consideration.

Infomediaries are in the information business. They are competing on their ability to capture and manipulate information in a manner that adds value for their clients. Hence, in some sense, infomediary acts as a go-between between those who want the information and those who supply it. Infomediary helps customers on the information gathering process, where customers search for information regarding their intended purchases. These functions of Infomediary make the five "information" aspects – *Information Source*, *Information Quality*, *Product Information*, *Information Timeliness*, and *Comparison Shopping* to be crucial factors in evaluating the success of Infomediary.

Other than information aspect, system quality is also important since it would affect customer's preference to use Infomediary. Customers dissatisfied with the system performance of the Infomediary are likely to leave even if the information suggested by the Infomediary is of high quality. System quality pertaining to customer satisfaction also has practical implications for the design of Infomediary. In our study, we consider four system quality factors that are important to the success of infomediaries – *Ease of Use, System Responsiveness, Personalization and Interactivity and Navigation*.

The above factors are taken into consideration for evaluating the success of Infomediary. A total of 29 objectives are identified after addition of the above factors to the objectives in Keeney's study. 20 of these objectives are means objectives and 9 are fundamental objectives. A total of 138 items were produced to measure the success factors of Infomediary. There were *96* questions in the means objectives category measuring 20 constructs while *42* questions in the fundamental objectives measuring 9 constructs. The list of means and fundamental objectives is depicted in Table 1.

Table 1 Mean Objectives and Fundamental Objectives

Means Objectives

1. Maximize product/service information quality
   - Maximize accuracy of information (revised)
   - Maximize the validity of information
   - Maximize the relevancy of information
   - Maximize the credibility of information

2. Maximize information source
   - Maximize the comprehensiveness of information source

3. Maximize product information
   - Maximize information about promotion
   - Maximize the information about product / service
   - Maximize available product information
   - Maximize the ease to identify the product refer to by Infomediary
   - Provide good textual representation of factual data
   - Provide clear description of product / Information
   - Include all main information about product

4. Maximize product information timeliness
   - Keep track of prices changes among multiple suppliers
   - Ensure the product information timeliness

5. Enhance comparison shopping
   - Maximize products for comparison
   - Provide comparison shopping
   - Maximize ease of comparison shopping
   - Maximize speed of comparison shopping

6. Maximize ease of use
   - Maximize ease of user interface
   - Make access easy
   - Make search process easy
   - Simplify finding desired product
   - Maximize ease of purchase

7. Enhance personalization and interactivity
   - Have many search possibilities (revised)
   - Facilitate information gathering (revised)
   - Generate query for customer preference customization
   - Get more focused profile of what is of interest to you (revised)

8. Enhance system responsiveness
   - Maximize transaction speed
   - Minimize response time of system

9. Make better purchase choices
   - Minimize likelihood of disappointment
   - Maximize confidence

10. Maximize product variety and availability
    - Increase variety of products
    - Maximize product selection
    - Have broad choice of products
    - Maximize range of quality options

11. Minimize personal travel
    - Minimize travel distance
    - Minimize driving effort

12. Minimize misuse of credit card
    - Minimize unauthorized use of credit card
    - Maximize safety of credit card

13. Minimize misuse of personal information
    - Minimize receipt of unsolicited material
    - Minimize transfer of personal Information

14. Maximize accuracy of transaction
    - Minimize charging errors
    - Minimize shipping errors
    - Minimize product errors

15. Minimize fraud
    - Maximize fraud protection
    - Discourage/prevent fraud
    - Maximize seller legitimacy
    - Maximize Infomediary legitimacy
    - Maximize neutrality of Infomediary

16. Assure system security
    - Maximize security of transaction
    - Discourage hacking

17. Assure reliable delivery
    - Provide reliable delivery
    - Assure arrival of purchase

18. Limit impulsive buying	
• Minimize "unwanted" purchases	
• Control unreasonable buying	

19. Offer personal interaction	
• Provide human customer support	
• Provide opportunity for personal interaction	

20. Navigation	
• Maximize navigation entertainment	• Have clear description of links
• Have adequate links to information	• Maximize ease to navigate

Fundamental Objectives

1. Maximize convenience	
• Maximize purchase convenience	• Minimize effort of shopping
• Maximize time flexibility in purchasing	• Minimize personal hassale
• Provide quality after-sales service	• Maximize ease of finding product
• Assure an easy return process	

2. Minimize time spent	
• Minimize purchase time	• Minimize search time
• Minimize processing time	• Minimize time to order product
• Minimize payment time	• Minimize time to gather information
• Minimize queuing time	• Minimize time to select a product
• Minimize time to find product	

3. Minimize cost	
• Minimize product cost	
• Minimize tax cost	
• Minimize shipping cost	

4. Maximize privacy	
• Avoid electronic mailing lists	

5. Maximize shopping enjoyment	
• Make shopping a social event	• Minimize disappointment
• Minimize worry	• Maximize customer confidence
• Inspire customer	• Reduce demand for forced labour
• Minimize regret	

6. Maximize product quality	
• Maximize product value	
• Ensure quality of product	
• Get the best product for the buck	

7. Minimize time to receive product	
• Minimize delivery time	
• Minimize shipping time	
• Minimize dispatch time	

8. Maximize safety	
• Minimize risk of product use	

9. Minimize environmental impact	
• Reduce environmental damages	
• Minimize pollution	

3.2. *Questionnaire: Demographic Variables and Measures*

138 items are generated in the item generation process as presented in Section 3.1.1 to measure the factors that influence Infomedairy success. The questionnaire was split into two parts. The first part includes 96 items that relate to issues that influence respondent decision to use infomediaries for electronic shopping (i.e. means objectives). The second part consists of 42 items that relate to respondent objectives when using infomediaries (i.e. fundamental objectives). Items were not sorted and sub-headings were not used. A five-point Likert-type scale was used, where 1= not at all; 2 = a little; 3 = moderately; 4 = much; and 5 = a great deal, for means objectives questions; while 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree, used for fundamental objectives. The instructions asked respondents to think about their engagement with Infomediary and circle the response that best described their belief. Respondents were also asked to answer demographic questions about gender, age, level of use and reason of use and their amount of spending on Internet shopping, etc.

3.3. Survey Administration and Sample Description

The survey was administered to graduate and undergraduate students in the Chinese University of Hong Kong in Hong Kong, and the University of Arizona and the Texas A and M University - College Station in United States. We also collected data from professionals in various fields. The same version of the questionnaire was used in both Hong Kong and the US since the program was in English and respondents felt comfortable responding to English version. Participation with the study was voluntary and respondents were given sufficient time to assess their responses. The completed questionnaires were either collected in person, or emailed or mailed in by the respondents later. A few filled questionnaires were discarded because of incomplete responses.

A sample of 98 usable responses was obtained representing 36 males (36.7%) and 62 females (63.3%) from the US (22.4%) and Hong Kong (77.6%). Respondents fall into the following age distribution: less than 20 (5.1%), 20-29(82.7%), 30-39(10.2%), and greater than 40 (2.0%). 59.2% of the respondents shops online 0–1 times per month, 31.6% of them does it 1–5 times per month, while 4% shop online over 5 times per month. Respondents spend on average HKD$2,649 in a year (standard deviation HKD$8607). Before they make their purchase, 41.8% of them visits 1–5 electronic stores while 15.3% of them visits over 5 stores. 36.7% of the respondents use infomediaries 1–5 times per month to assist their online shopping.

4. DATA ANALYSIS

In our study, we developed a measurement model to measure the factors that influence infomediary success. The purpose of a measurement model is to describe how well the observed indicators serve as a measurement instrument for the latent variables (Joreskog and Sorbom (1993). In our case, the latent variable is the success of Infomediary. The data were analyzed with several objectives in mind: purification, unidimensionality, reliability, brevity, and simplicity of factor structure. Reliability is the extent to which an experiment, test, or any measuring procedure yields the same results on repeated trials.

4.1. Purification

We first purify the items before factor analysis. Churchill ((1979) describes the need to purify before factor analysis on the data, i.e. to eliminate "garbage items", in the hope of determining the number of dimensions underlying the construct. The rationale behind is that when factor analysis is conducted before purification, the "garbage items" produce more dimensions than can be conceptually identified, thus, confounding the interpretation of the factor analysis.

Accordingly, for purification, the first step is to calculate the item-total correlations and coefficient alpha, which are used to delete garbage items (Churchill, 1979; Cronbach, 1951). Two independent criteria were used to eliminate items. First, items were eliminated if their corrected item-total correlation (the correlation of each item with the sum of the other items in its category) were less than 0.50. The support for this procedure is the domain-sampling model. The key assumption in this model is that all items, if they belong to the domain of the concept, have an equal amount of common core. If all the items in a measure are drawn from the domain of a single construct, responses to those items should be highly intercorrelated. The correcteditem-total correlation provides a measure of this (Suh et al., 1994).

The second step for item elimination is using internal consistency or reliability. Internal consistency is the extent to which tests or procedures assess the same characteristic or quality. In our study, we analyze the internal consistency of the survey items dealing with the success factor of Infomediary in order to reveal the extent to which items on the questionnaire focus

on the motion of value of Infomediary to customer. Hence, the reliability of items comprising each dimension was examined using Cronbach's alpha to see if additional items could be eliminated without substantially lowering reliability. In our study, items were eliminated if the reliability of the remaining items was at least 0.90. Where deleting either of two items that would have the same impact on Cronbach's alpha, the item with the higher correlated item-total correlation was retained.

4.2. Identification of Factor Structure

After the above deletions, an exploratory factor analysis of the remaining items in each category was conducted to determine the factor structure of the entire set of items, and at the same time to assess the unidimensionality of the retained items for each group. There are two main kinds of factor analysis: Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA). Confirmatory Factor Analysis (CFA) is a kind of theory testing approach. It is based on strong theoretical or, empirical foundation. While the purpose of Exploratory Factor Analysis (EFA) is to identify the factor structure or model for a set of variables, i.e. how many factors exist and pattern of factor loadings. It also determines whether the factors are correlated or uncorrelated. The variables are free to load on all factors. It is a kind of theory generating method. Contrary to CFA, EFA is employed when only heuristic or weak literature exists. Hence, in our case, we chose to use EFA for the factor analysis. This method helped to identify factorially pure items that would facilitate the testing of more specific hypotheses (Weiss, 1970), and to identify the components that make up the total measure (Campbell, 1976).

5. RESEARCH FINDINGS

Descriptive statistics

Of the 96 items related to means objectives, 92 items reported a mean over 3, with only 4 items have a mean under but close to 3 (ranges from 2.87 – 2.96). All of the 42 items measuring fundamental objectives have means over 3.

Purification- Means Objectives

The item purification procedure, described above, allowed us to eliminate 35 out of the 96 items for the means objectives category because they have corrected item-total correlation below 0.5. Reliability analysis resulted in elimination of 3 more items. The elimination of these items individually cause an increase in Cronbach's alpha with the remaining items in that dimension. In the item-deletion procedures, all items in the constructs product information, system security and personal transaction support are eliminated. This resulted in the removal of these 3 dimensions. The 58 remaining items on 17 dimensions are further analyzed for factor structure.

Factor Structure Identification – Means Objectives

We proceeded with the dimensionality of the remaining constructs. An exploratory factor analysis was conducted for the remaining 58 items using Varimax as the rotation method. Bartlett's test of sphericity was 4594.022 ($p < 0.0001$). This suggests intercorrelation matrix contains enough variance to make factor analysis worth pursuing. Since the vast majority of the communalities are greater than 0.7 (only communalities of 6 items lies between 0.602 to 0.674), we use the Kaiser rule as the criterion for deciding the number of components to retain in the principal component analysis. Under this rule, 14 components are retained which explained 75.875% of the variance. 21 impure items are because their loadings are larger than

0.30 on more than one factor. After the impure items are deleted, the remaining items have strong factor loadings (i.e. larger than 0.512).

The results suggested a model with 11 factors and 37 items. 7 out of 11 factors are eliminated since the Hotelling test is not significant for these 7 sub-scales. After these eliminations, a 4-factor model consisted of 21 items is remained. Using this data set, the corrected item-total correlation and Cronbach's alpha were calculated. The range for corrected item-total correlation was 0.6801 to 0.8467 for online payment, 0.5984 to 0.8345 for navigation design, 0.7212 to 0.7713 for information relevance, and 0.6490 to 0.8363 for product choice. Reliability statistics were 0.9273, 0.9146, 0.8640, and 0.8709 for online payment, navigation design, information relevance and product choice respectively. Overall reliability for the 21-item scale was 0.8600. The Hotelling test was significant for all 4 subscales ($p < 0.0175$) with F-values ranging from 2.6217 (for navigation design) to 4.7578 (for product choice). Hotelling tests are differences among the entire set of dependent variables. The description of the items in the emerged instrument is listed in Table 2.

Construct validity- Means Objectives

The instrument's correlation matrix was analyzed for convergent and discriminant validity. The smallest within variable (factor) correlations are: online payment = 0.499 navigation design = 0.431, information relevance = 0.647, and product choice = 0.586. For a sample of 98, these are significantly ($p < 0.01$) different than zero and large enough to encourage further investigation of discriminant validity. Based on the examination of correlation matrix, there is no violation of the discriminant validity condition.

Table 2 Item description for instrument measuring Means Objectives

Item Code	Item Description
Online Payment	
OP1	I am concerned about shipping errors.
OP2	I am concerned about my personal information being shared.
OP3	I worry about being charged inaccurately.
OP4	I am concerned about misuse of my personal information.
OP5	I am concerned about charging errors.
OP6	I am concerned about receiving unsolicited materials.
OP7	I am concerned about transaction errors.
Navigation Design	
ND1	I feel that the infomediary systems have clear design.
ND2	I feel that the infomediary systems are well-organized.
ND3	I feel that the infomediary systems are user-friendly.
ND4	I feel that the infomediary systems are easy to use.
ND5	I feel that the infomediaries are easy to navigate.
ND6	I feel that the infomediaries have simple layout for their content.
ND7	I feel that it is easy to go back and forth between pages of the infomediary.
ND8	I feel that the description for each links on infomediaries are clear.
Information Relevance	
IR1	I feel that the information that I get from infomediaries is related to the purchase decision.
IR2	I feel that the information that I get from infomediaries is pertinent to the purchase decision.
IR3	I feel that the information that I get from infomediaries is relevant to the purchase decision.
Product Choice	
PC1	I like to have greater product choice.
PC2	I like to have greater product selection.
PC3	I like have maximum range of quality product options.

Purification- Fundamental Objectives

We proceeded to the analysis of Fundamental Objectives. Following the same item purification procedures allowed us to eliminate 8 out of the 42 items for the fundamental objectives category because they have corrected item total correlation below 0.5. Reliability analysis resulted in elimination of 2 more items. The elimination of these items individually cause an increase in Cronbach's alpha with the remaining items in that dimension. In the item-deletion procedures, all items in the construct Maximize privacy are eliminated. The 32 remaining items on 8 dimensions are further analyzed for the factor structure.

Factor Structure Identification- Fundamental Objectives

Similar as the analysis conducted for means objectives, we continued with the dimensionality of the remaining constructs. An exploratory factor analysis was conducted for the remaining 32 items using Varimax as the rotation method. Bartlett's test of sphericity was 2315.664 ($p < 0.0001$). This suggests intercorrelation matrix contains enough variance to make factor analysis worth pursuing. Since the majority of the communalities are greater than 0.7 (only communalities of 8 items are less than 0.65 but over 0.55), we use the Kaiser rule as the criterion for deciding the number of components to retain in the principal component analysis. Under this rule, 8 components are retained which explained 74.925% of the variance. 13 items with loadings larger than 0.30 on more than one factor, i.e. impure items, are deleted. After the impure items are deleted, the remaining items have strong factor loadings (i.e. larger than 0.512). The results suggested a 8-factor model with 19 items. 2 out of 8 factors are eliminated since the Hotelling test is not significant for these 2 sub-scales. After these eliminations, a 6-factor model consisted of 14 items resulted. Using this data set, the corrected item-total correlation and Cronbach's alpha were calculated. The range for corrected item-total correlation was 0.5395 for shopping enjoyment, 0.6860 to 0.8246 for transaction time, 0.5569 to 0.7747 for shopping convenience, 0.6196 for product value, and 0.7815 for cost. Reliability statistics were 0.7002, 0.8752, 0.8177, 0.7651, and 0.8774 for shopping enjoyment, transaction time, convenience, product value and cost respectively. For the factor searching time, as it is a single item construct, no corrected item-total correlation and reliability statistics can be computed. Overall reliability for the 14-item scale was 0.8416. The Hotelling test was significant for 5 subscales ($p < 0.0155$) with F-values ranging from 5.8148 (for transaction time) to 14.9354 (for shopping convenience). Hotelling tests are differences among the entire set of dependent variables. The item descriptions for items in this new instrument are listed in Table 3. In order to support the Varimax method is tenable, we performed the exploratory analysis using Direct Oblimin method - one of kind of oblique rotation. The component correlation matrix was studied. We found out all of entries in the correlation was close to zero, with only 2 exceptions (the correlations are 0.390 and -0.412). However, a further study indicated the components given rise to these exceptions will be eliminated due to the impurity of items. Hence, this bolsters the use of orthogonal rotation for exploratory factor analysis.

Construct validity- Fundamental Objectives

The instrument's correlation matrix was analyzed for convergent and discriminant validity. The smallest within variable (factor) correlations are: shopping enjoyment = 0.540 transaction time = 0.620, shopping convenience = 0.501, product value = 0.620 and cost = 0.782. For a sample of 98, these are significantly ($p < 0.01$) different than zero and large enough to encourage further investigation of discriminant validity. Based on the examination of correlation matrix, there is no violation of the discriminant validity condition.

Table 3 Item description for instrument measuring Fundamental Objectives

Item Code	Item Description
Shopping Enjoyment	
SE1	It is important to minimize regret of shopping.
SE2	It is important to inspire customer.
Transaction Time	
TT1	It is important to minimize queuing time.
TT2	It is important to minimize waiting time.
TT3	It is important to minimize payment time.
Shopping Convenience	
SC1	It is important to maximize purchasing convenience.
SC2	It is important to maximize convenience.
SC3	It is important to minimize time pressure when shopping.
Product Value	
PV1	It is important to get the best product for the buck.
PV2	It is important to ensure quality of product.
Cost	
CO1	It is important to minimize tax cost.
CO2	It is important to minimize shipping cost.
Searching Time	
ST1	It is important to minimize time to find product.
ST2	It is important to minimize search time.

A Model for Measuring factors that Influence Infomediary Success

In conclusion, we have developed two instruments to measure the means objectives and fundamental objectives, which are critical factors that influence Infomediary success. The 4 factor, 21 item model for the means objectives, and the 6 factor, 14 item model for fundamental objectives, both are emerged from the purification process was demonstrated to produce acceptable reliability estimates, and evidence also supported its convergent validity and discriminant validity.

6. CONCLUSION

In measuring success of Infomediary, a critical task is to identify the key constructs of success, which is often linked to satisfaction of the user, and to develop a validated instrument to measure them. Hence, this study has immediate implications for Infomediary on the Web and for research in success of Infomediary.

Implications Since online shopping becomes a common practice, Infomediary has emerged as an assistant for customer online shopping activities. Company operating as Infomediary needs to find out how to be successful in order to compete in the Internet market. The ultimate questions about the success of Infomediary depend on how customers perceive its value. Our study makes contribution to Internet Commerce by generating a list of items that cover different dimensions to measure the success of Infomediary - a kind of business model in Internet Commerce. The study employs an exploratory approach for the instrument development and follows widely accepted methodologies. The rigorous validation procedure brings out a parsimonious 4-factor, 21-item instrument for measuring means objectives and a 6-factor, 14-item instrument for measuring fundamental objectives. Having access to reliable and scientifically tested metrics, the practitioners would be able to examine the structure and dimensionality of Infomediary success. Our proposed metrics can assist Infomediary companies in this regard and help them to develop an effective design for the Infomediary. Besides, the validated measures could pave the way for researcher to investigate the success of Infomediary through formulation of means and fundamental objectives of customer using the Infomediary.

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